

Cyclones and gales.—The greater number of the North Pacific cyclones of December 1934 were of oceanic origin, and fewer than the usual number of depressions of consequence for the season entered the sea from Asia. The most important of these few occurred at the end of the month, when a small cyclone of no great depth crossed Japan and, intensifying rapidly upon passing to sea, caused gales which attained a maximum force of 12 NE., late on the 29th, and of force 10–11 during the forenoon of the 30th, between Yokohama and longitude 145° E.

Practically all other gales occurring north of the Tropics, even those of the 19th, with force of 10, east of Hokushu, were associated with cyclonic activities which arose at sea and expanded eastward or westward during their fluctuations.

The month as a whole was stormy. Pressures well below 29 inches were recorded on several days; and gales exceeding force 10 were encountered on at least 8 days north of the 30th parallel.

On December 2 the Aleutian Low began to spread and deepen. By the 4th a great low-pressure system extended from the east Bering Sea far southward, with barometer down to 29.72, accompanied by a west gale, and force 8, even at Midway Island, while in 48½° N., 160½° W., the American S.S. *Jefferson Myers* was experiencing a strong northwesterly gale, barometer 28.44. On the 5th this ship, when 4° farther eastward, ran into a south gale of force 11, with lowest pressure at the unusual value of 27.76 inches. The Japanese M.S. *San Diego Maru*, on the 6th, reported a pressure reading of 27.94 inches, in conjunction with a southwest hurricane, near 46° N., 154° W. Heavy gales and low pressures continued until early on the 7th, after which the weather moderated. The field of severest storminess and lowest pressures during the period 5th to 7th extended from the eastern Aleutians southeastward to about latitude 45° N., longitude 145° W.

On the 13th to 17th the Low again deepened, and spread southward from Bering Sea toward Midway Island. Along the upper routes the wind attained forces of 9 and 10 south of the Aleutians in the early part of this period, with lowest observed pressure 28.35. On the 17th the heaviest winds (forces 11–12) were experienced along the middle routes north of Midway Island, between 180° and 170° W. On this date strong gales were encountered also to the eastward of the Kuril Islands on the northern route to Japan.

On the 25th the American S.S. *Golden Dragon*, San Francisco to Yokohama, experienced a south gale of force 11, near 34° N., 161° E., in connection with a cyclone of moderate depth in the neighborhood. This steamer on its westward voyage had the rather unique experience of not only weathering this severe gale of the 25th, but also of previously passing through the hurricane belt of the 17th north of Midway Island, and on the 29th and 30th of battling with the equally heavy cyclonic gales a day's voyage out from Yokohama.

Toward the end of December a local cyclone occurred off the Washington coast. It originated as a small depression near 49° N., 134° W., early on the 25th, and by midnight had so developed in intensity as to cause winds of force 11 at several coastal points. At North Head the extreme wind velocity on the 25th was 65 miles an hour from the south; at Tatoosh Island, it was 71 miles from south and southwest during the night of the 25th–26th, with a low barometer of 28.82 inches. The storm center hung off the coast until the 29th, and was accompanied on land by damaging rains. A few steamers reported gales of force 8–9 between the coast and 135°

W., extending as far south as the thirty-fifth parallel, on the 26th to 28th.

At the close of the month a deep and extensive cyclone raged over much of the central-western part of the northern steamship route, with winds of force 11–12 reported between 45°–50° N., 160° E. and 170° W. The American S. S. *President McKinley*, in this storm, reported a pressure of 28.59 inches, accompanied by a north hurricane.

Typhoons.—In an accompanying report, the Rev. Fr. Doucette describes the typhoons and depressions in the Far East during December 1934. The typhoon of November 30–December 6 was the most intense of the month at sea; and in its early stages, on December 1, had attained full hurricane strength a short distance southwest of Yap, as shown by the report of the British M.S. *Comliebank*. The ship on that date had a low barometer reading of 28.81 inches. On the 2d, as the cyclone swept up to the eastward of the Philippine Islands, the Panaman M. S. *Noumea* experienced a wind of force 11 a short distance south of the center of the storm. The M. S. *Comliebank*, bound northwest toward Shanghai after her first encounter with the storm, again entered the storm area on the 4th, after the recurve. At this time the typhoon's energy had abated, and the highest wind velocity encountered by the ship was from the north, force 9.

Tehuantepecers.—Owing to the frequent extensions of anticyclones of the United States into the Gulf of Mexico, an unusual amount of norther-type weather occurred in the Gulf of Tehuantepec. While the induced gales were not heavy, yet northerly winds of force 8 were experienced in the Gulf on the 6th, 12th, 14th, 20th, 26th, and 29th.

Fog.—Fog was of very little meteorological importance this month. It occurred on 4 days off the southern and Lower California coasts, and on a few days in widely scattered areas elsewhere over the ocean.

TYPHOONS AND DEPRESSIONS OVER THE FAR EAST, NOVEMBER 1934

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During November 1934, there were two typhoons and one depression over the regions of the Far East. The last few days of the month saw a typhoon form over the Caroline Islands and move toward the archipelago, crossing the islands in December.

Depression, November 1 to 6.—The depression formed November 1 in the Pacific Ocean between Palau Island and Mindanao. It moved northwest, then west (Nov. 3) across the Visayan Islands and northern Palawan. November 4 found it in the China Sea, where it changed its course to west-northwest, entering Indo-China November 6.

Typhoon, November 10 to 19.—Forming over the eastern Caroline Islands, this typhoon appeared November 10 about 500 miles southeast of Guam. It moved rapidly on a west-northwest course, traversing the distance to the Philippines in 4 days. On the morning of the 14th, it was close to and approaching the northern part of Samar Island. Changing to a northwest course, it crossed Samar Island between Laoang and Calbayog, passed over Legaspi, Albay Province, then west of Naga, Camarines Sur, north of Atimonan, Tayabas Province, and approached Manila, the forenoon of the 15th. About noon it passed between Infanta, Tayabas Province, and Manila, at the same time decreasing in intensity. Moving northwest, it crossed the Provinces north of Manila. It was in the

China Sea the morning of the 16th, close to and west of the coast of Luzon. It was a very small center, within 70 miles of the coast, as the observations taken on board the S. S. *Anking* show. This ship, en route to Manila, followed the one hundred and nineteenth meridian very closely and yet passed west of the typhoon on the afternoon of the 17th. The next day, the typhoon was over the western part of the Balintang Channel, where it changed its course to the northeast, filling up over the Nansei (Loochoos) Islands, November 19.

At Legaspi, the minimum reading of the barometer was 723.45 millimeters (28.482 inches); at Naga, 728.87 millimeters (28.695 inches). The rains which this typhoon brought caused many deaths in and around the town of Mauban, Tayabas Province. Seventeen hours of rain over the sources of the Mauban River caused a sudden and destructive flood, which took a toll of 52 lives. The province of Tayabas suffered heavily and, on November 24, the Governor released the report that 106 lives were lost because of this typhoon.

Typhoon, November 24 to December 3.—This typhoon first appeared on the weather map of November 24, 2 p. m., located about 500 miles southeast of Guam. It moved west-northwest and then was almost stationary, November 25 and 26, over the regions about 300 miles south-southwest of Guam. Taking a more westerly course, it approached the island of Yap November 27, passing that island on a west by south course early in the forenoon of the same day. Moving very fast on a west by north course, it approached the Visayan Islands, being located on November 28 near latitude 10° N., longitude 131° E. November 29, at 6 a. m., it was close to and south of Tacloban, Leyte Province, now changing to a west-northwest course. Crossing the Visayan Islands, it moved southwest of Masbate, north of Capiz, close to and south of Odiongon. The next morning, (Nov. 30) it was over northern Mindoro. It continued its west-northwest course into the China Sea for 2 days. On December 2, it changed its course more to the west and filled up over the Paracel Islands the next day.

This storm was the cause of much destruction to crops and light-material houses; little loss of life was reported, except the case of the sinking of the M. S. *Pulupandan* which was lost off Pandan, Antique Province, about 6:30 p. m. November 29. Of the crew of 28, 7 were saved, according to the newspapers of December 5.

Of the stations reporting, Guiuan, Samar Province, reported the lowest barometric minimum, 724.80 millimeters (28.535 inches). Tacloban, Leyte Province reported 727.24 millimeters (28.631 inches).

TYPHOONS AND DEPRESSIONS IN THE FAR EAST, DECEMBER 1934

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Four typhoons and 1 depression, 2 of which were exceptional because of their courses, occurred during the month. We shall consider these in chronological order.

Typhoon, November 30 to December 6.—The approximate positions of this typhoon, day by day, were:

November 30, 6 a. m., latitude 8° N., longitude 142°30' E.
December 1, 6 a. m., latitude 8°30' N., longitude 135° E.
December 2, 6 a. m., latitude 12° N., longitude 128°30' E.
December 3, 6 a. m., latitude 15°30' N., longitude 124°30' E.
December 4, 6 a. m., latitude 21°30' N., longitude 129° E.
December 5, 6 a. m., latitude 26°30' N., longitude 137° E.
December 6, 6 a. m., latitude 30° N., longitude 141° E.

This typhoon was severe. As it passed Yap, about 60 miles to the south, a barometric minimum of 742.3 milli-

imeters (29.22 inches), was recorded, together with winds of force 9 from the east. On December 3, about 200 miles east of Luzon, it caused destructive rains in the Cagayan River Valley (northern Luzon). Also, on December 4 and 5, the northerly winds on the western side of the typhoon reinforced the circulation around the high-pressure area over China to such an extent that strong northeast monsoon winds extended as far as Singapore. The path of this typhoon was unusual for the time of year. The usual course of typhoons during the late months of the year is across the archipelago, so that one which recurves to the northeast is considered exceptional. It was very fortunate for the Philippines that this typhoon recurved and did not pass over any part of the Islands.

Typhoon, December 3 to 7.—This typhoon formed in the China Sea and moved eastward, decreasing in intensity as it crossed the archipelago. The daily positions are given below:

December 3, 6 a. m., latitude 10° N., longitude 116°30' E.
December 4, 6 a. m., latitude 11° N., longitude 119° E.
December 5, 6 a. m., latitude 11° N., longitude 122° E.
December 6, 6 a. m., latitude 11° N., longitude 129° E.
December 7, 6 a. m., latitude 12° N., longitude 134° E.

Regarding the formation of this typhoon, there are two possibilities. The typhoon of November 24 to December 3 (briefly described in the typhoons of November 1934) was in the China Sea close to the same region where the present typhoon appeared. There were at the time northeast monsoon winds of considerable intensity over the China Sea, so the typhoon could not move very far on a westerly course; there is no definite evidence that it filled up, and so it is possible that it moved southward and appeared in the China Sea west of Palawan Island, centered in the position given above. On the other hand, from observations at Puerto Princesa, Palawan Island, and also observations taken on board the S. S. *Fathomer*, then in port at an island at the southern portion of the Palawan group, it seems to have been a new typhoon. It was considered merely a low-pressure area until the S. S. *Habibi* sent observations which definitely proved that it was a typhoon. Its eastward course was not rapid, and, fortunately it decreased in intensity as it moved. It caused great destruction in the town of Bacuit, Palawan Province. Its path across the Visayan Islands was along a well-defined front, between the northeast monsoon and the southwest monsoon, as it is called. The surface and cloud observations from the stations in the Philippines together with pilot balloon reports received by radio from Singapore and Alor Star gave clear evidence of the existence of this front. The typhoon moved with the warmer current of air.

A few words concerning the general situation during these days might be of interest. From November 20 on, the high pressure over China became stronger, then weaker, then stronger. Then the typhoon of November 24 to December 3 formed and moved across the archipelago. Following it was the very severe typhoon described above, which, however, recurved. When it reached the ocean area east of northern Luzon and Formosa, it caused the northeast monsoon to intensify. In the China Sea, this prevented the typhoon which had just crossed the Visayan Islands (Nov. 29 and 30) from moving in a westerly direction. It moved more slowly and seemed to be filling up. Then, a typhoon appeared west of northern Palawan (Dec. 3, lat. 10°, long. 116°30') and began to move in an easterly direction. In advance of it was the well-defined front, and its course was practically that of the boundary between the two wind systems. When this typhoon moved into the Pacific Ocean,